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Claims

1. Vehicle pneumatic tyre with a highly tensile belt extending substantially across the width of the tread strip essentially serving to stabilise the sides of the tyre, characterised in that an annular, highly tensile reinforcing insert (9) of an essentially conical shape is disposed at a distance from the belt edges (14), in the upper side wall region of the tyre body, leaving a zone (Z) between the belt edges on the one hand and the reinforcing insert on the other, which contains no belt and only the carcass reinforcement (1) running through it.
2. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the belt width (b) is approximately 0.6 to 0.8 of the tread surface width (B).
3. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the reinforcing insert (9) is disposed at approximately 0.75 of the height of the tyre body (by reference to its centre line).
4. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the width (V) of the reinforcing insert is $1/5$ to $1/15$, preferably $1/8$ to $1/12$ of the belt width (b).
5. Vehicle pneumatic tyre as claimed in claim 1,

characterised in that the belt-free zone (Z) between the belt edges (14) on the one hand and the reinforcing insert (9) on the other is 1.0 to 2 times the width (V) of the reinforcing insert (9), preferably 1.5 V.

6. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the reinforcing insert (9) is thicker at the centre.
7. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the reinforcing insert (9) consists of two or more cord fabric layers (12, 13) with mutually crossing thread-shaped strengthening supports.
8. Vehicle pneumatic tyre as claimed in claim 1, characterised in that the reinforcing insert (9) consists of one or more cord fabric layers with thread-shaped strengthening supports running practically in the tyre circumferential direction (Fig. 2).

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Vehicle pneumatic tyre

The invention relates to a vehicle pneumatic tyre with a highly tensile belt extending substantially across the width of the tread strip essentially serving to stabilise the sides of the tyre, the edges of which are disposed at least substantially underneath the tread surface edges in a manner that has been proposed in the past. Also in a known manner, this belt may also consist of two or more cord fabric layers, the thread-like strengthening supports of which may subtend angles of approximately 15 to 25° with the tyre circumferential direction in order to obtain sufficient tensile strength in the tyre circumferential direction.

In known vehicle pneumatic tyres, and indeed in vehicle pneumatic tyres in which the belt edges are strengthened by one or more circumferential strips in the region of the tyre shoulders, an uneven specific compression stress occurs (strain on exposure to radial forces). This stress and these forces are predominantly concentrated in the region of the tread surface edges, whereas the contact pressures are significantly lower in the region of the tread surface centre accordingly. This understandably leads to corresponding stress on the tread strip, in other words uneven wear across the width of the tread strip.

The underlying objective of the invention is to render the stress on the tyre in the region of its apex more

uniform, so that the specific surface stress can be rendered more uniform as viewed across the width of the tread strip, by providing additional annular reinforcing inserts of a particular design and disposition.

This objective is achieved by the invention due to the fact that an annular, highly tensile reinforcing insert of an essentially conical shape is disposed at a distance from the belt edges, in the upper side wall region of the tyre body, leaving a zone between the belt edges and the reinforcing insert which contains no belt and has only the carcass reinforcement running through it.

These reinforcing inserts on either side in the upper side wall region prevent excessive lateral bulging of the upper, i.e. radially outer, tyre side walls; this imparts a certain degree of additional anchoring to the upper side wall region as a result.

It must be assumed that, as a result of this anchoring, the lateral forces which occur counteract lateral shifting causing stress at the tyre tread edges in some specific way. Consequently, wear is also reduced in the region of the tread surface edges so that the tyre has a significantly longer service life as a result.

These reinforcing inserts are also built in a known manner in the form of a tyre belt, in other words preferably from mutually parallel threads, wires or similar, but preferably such that the elements of the reinforcing insert practically extend in the tyre circumferential direction. This extension ensures that

particularly high anchoring forces can be applied, given the substantially conical shape of the reinforcing insert. Furthermore, however, reinforcing inserts may also be made from a homogeneous sheet metal or plate-type material, which may then be provided with orifices. The important thing is to obtain the conical shape and produce sufficient tensile strength in the tyre circumferential direction.

In order to avoid unnecessarily impairing the capacity of the tyre side walls to deform, especially in the region of the half side walls, thereby impairing the softness of the tyre, the reinforcing inserts disposed at the two sides of the belt should be of a relatively short width only. Another important factor is the spacing of these reinforcing inserts and the belt edges. For practical purposes, the width of the reinforcing inserts proposed by the invention should be approximately one fifth to one fifteenth, but preferably one eighth to one twelfth, of the belt width. Furthermore, the free axial distance of the reinforcing inserts from the belt edges preferably also corresponds to these values. However, this distance could be increased by a factor of $1 \frac{1}{2}$.

It is not just the conical shape of the reinforcing inserts that is important but also the way in which they are disposed in the side walls. The longitudinal centre line is preferably disposed essentially at approximately half height between the half side wall height and the biggest height (biggest diameter) of the tyre. This ensures that the capacity of the side walls to deform is not impaired or is so to a certain extent only, as

explained above, whereas a sufficiently large zone of the belt layer is left between the reinforcing insert and the belt at the same time.

Other details will be explained with reference to an example of an embodiment illustrated in the appended drawings. Of these:

Fig. 1 is a radial part-section through a vehicle pneumatic tyre,

Fig. 2 is a plan view onto the tyre section illustrated in Fig. 1, the reinforcing inserts of which are highlighted and disposed in the plane of the drawing in order to provide a clearer illustration, and

Fig. 3 is a partial plan view of a reinforcing insert of the tyre illustrated in Fig. 1.

The body of the tyre, which is essentially made from rubber or rubber-like materials, has a radial carcass 1, the ends of which are anchored by wrapping the bead cores 2 into the tyre beads 3. Disposed underneath the tread strip 4 with the tread surface 4 is a highly tensile belt 6 made from cord fabric layers, extending in the tyre circumferential direction, which stabilises the tyre in the transverse direction of the radial carcass 1. The belt layers 7 and 8, which can be seen in Fig. 2, have mutually crossing strengthening supports forming a lozenge-shaped bandage. The width b of the belt 6 is 0.6 to 0.8 of the width B of the tread surface 5. Preferably,

however, the width b is $0.75 B$ and the belt 6 is disposed at the centre underneath the tread surface 5.

In order to achieve a tread surface which wears evenly and obtain said anchoring of the apex part of the tyre, a highly tensile reinforcing insert 9 is provided respectively on each side of the belt 6 in the circumferential direction, in the form of an annular belt which is highly tensile substantially in the direction of the belt 6 and, as illustrated in Fig. 2, made from one or more, but preferably two layers of highly tensile threads or similar running practically in the circumferential direction. However, as illustrated in Fig. 3, the reinforcing insert 9 may also incorporate two layers 12, 13 with mutually crossing, highly-tensile threads or similar, whereby one layer, preferably the one placed on top, has a narrower width and is centrally disposed relative to the other layer 12. The width of the layer 13, which is preferably disposed on the outside, should preferably be 0.5 of the width of the layer 12.

The reinforcing insert 9 is disposed substantially at half height between the half side wall height and the biggest height of the tyre body (tread surface 5). By reference to the total height H of the tyre body, the reinforcing insert 9 is therefore disposed at approximately $0.75 H$.

It is also important that the reinforcing layer 9 should be disposed at a distance from the side edges 14 of the belt 6 so that the part of the tyre in this area comprises nothing but rubber or similar or consists of

rubber with the section of carcass disposed there. The width of this zone Z should be approximately one to two times the width V of the reinforcing insert 9 but the zone Z should preferably have a width of $1.5 V$, whereas the V values should be from $1/5$ to $1/15$, preferably $1/8$ to $1/12$ b.

The purpose of a reinforcing insert made in this way is to prevent too excessive lateral deflections of the upper side wall region in the area of contact with the ground. As a result, stress and wear of the tread surface is rendered uniform without impairing the function of the belt.